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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/807,739	03/24/2004	Mark E. Thompson	10020/31502	6530
26646	7590	09/29/2006	EXAMINER	
KENYON & KENYON LLP			YAMNITZKY, MARIE ROSE	
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NEW YORK, NY 10004			ART UNIT	PAPER NUMBER
			1774	

DATE MAILED: 09/29/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/807,739	THOMPSON ET AL.	
	<b>Examiner</b> Marie R. Yamnitzky	<b>Art Unit</b> 1774	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 24 Mar 2004, 07 Jun 2004 and 20 May 2005.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-110 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-110 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date rec'd 07 Jun 2004 and 20 May 2005.
- 4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) Notice of Informal Patent Application
- 6) Other: \_\_\_\_\_.

1. The disclosure is objected to because of the following informalities:

The Figure number needs to be supplied in the tenth line of paragraph [0069].

Appropriate correction is required.

2. Claims 10, 26-32, 44, 45, 50-52 and 54-110 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 10, 29-30, 44, 45, 50-52, 63, 84-86, 100, 101 and 106-108: The R variables are not fully defined when R is a group that contains R (i.e. when R is CO<sub>2</sub>R, C(O)R, NR<sub>2</sub> or OR).

Claims 26-32 and 81-88: The use of the term “further” in the third line from the end of claim 26, and in the eighth line of claim 81 is confusing. It is not clear what the bridging ligand must comprise in addition to the specified structure.

Claims 44 and 100: The limitations regarding “m” and “m + n” are inconsistent with the formula. The variables m and n indicate the number of ligands that are coordinated to iridium, with the iridium also being coordinated to one divalent acetylacetone portion of a diacetylacetone ligand. The possibility of m is 3 and/or m + n is 3 would require iridium to have an oxidation state providing a coordination number of 8. To the examiner’s knowledge, iridium does not have an oxidation state that provides a coordination number of 8.

Claims 54-110: The use of the term “further” in the third line of claims 54, 72, 81 and 89 is confusing. It is not clear what the emissive layer must comprise in addition to the specified compound.

Claims 106-109: The structure required by claims 106-109 is inconsistent with the structure required by claim 102, from which claim 106 depends. It is not clear if claims 106-109 require at least two different compounds, one having the structure set forth in claim 102 and one having the structure defined in claims 106-109, or if claim 106 should depend from a claim other than 102 (possibly claim 89?).

3. Regarding claim interpretation:

In the definition of rings A and B in claims 10 and 63, and the definition of ring A in claims 44 and 100, the examiner interprets “aromatic” (first occurrence) as being an alternative to “heterocyclic” (first occurrence). This interpretation is consistent with the structures shown in dependent claims 11-17, 46-48, 64-70, 102-104 and 106-109, which represent compounds wherein at least one of rings A and B, in the case of claims 10, 63 and dependents, or ring A, in the case of claims 44, 100 and dependents, is an aromatic ring, but not an aromatic heterocyclic ring.

The variables a-d are not explicitly defined in claims 10 and 63. The variables e-h are not explicitly defined in claims 29, 50, 84 and 106. The variables i-l are not explicitly defined in claims 44 and 100. Absent a definition to the contrary, the examiner interprets these variables as representing up to the maximum number of substitutable positions on the rings to which R may be attached.

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4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 33, 37 and 40 are rejected under 35 U.S.C. 102(b) as being anticipated by

Schlicke et al. in *J. Am. Chem. Soc.* 121, pp. 4207-4214 (1999).

See the whole article. In particular, see Chart 1 on p. 4208, and see Table 1 on p. 4213.

Compounds of the formulae shown in Chart 1 wherein M = Ru and M' = Os meet the limitations of present claims 33, 37 and 40.

6. Claims 1, 5, 7-10, 18, 22, 24-31, 33-35, 39, 41, 42, 49-52, 54, 58, 60-63, 71, 72, 76, 78-86, 88-91, 95, 97, 98, 106-108 and 110 are rejected under 35 U.S.C. 102(e) as being anticipated by Tsuboyama et al. (US 6,783,873 B2).

Claims 106-108 are included in this rejection if claim 106 depended from claim 89.

See the entire patent.

Tsuboyama et al. disclose metal coordination compounds having a bridging ligand coordinated to two metal centers wherein each metal has an atomic weight greater than 40. The metal coordination compounds are disclosed for use in the luminescence layer of an organic

luminescence device comprising an anode, a cathode and a luminescence layer. For example, see column 1, line 7-24, c. 4, l. 17-65, and c. 8, l. 60-c. 26, l. 24.

The bridging ligand represented by formula 15 as set forth at the top of column 12 of the patent is the bridging ligand required by present claims 9, 24, 26, 41, 62, 78, 81, 97 and dependents.

Of Tsuboyama's compounds, it is reasonable to expect that at least Compound Nos. 511-517 and 548-553 meet the limitations recited in the last two lines of present independent claims 1 and 54, and the last five lines of present independent claims 18 and 72, given the teachings in paragraph [0071] of the present specification. These prior art compounds have two platinum metal centers with diacetylacetone (diacac) as the bridging ligand. Further, it is reasonable to expect that at least Compound Nos. 589-595, 626-631 and 719-725 also meet the limitations recited in present claims 1 and 18 since the palladium of these compounds is square planar like platinum.

Of the compounds referenced in the preceding paragraph, at least Compound Nos. 511, 548-553, 589, 626-631 and 719 further meet the limitations recited in present claims 5, 22, 58 and 76. Each of these prior art compounds has at least one unsubstituted phenylpyridine (ppy) ligand. The ppy ligand has a triplet energy corresponding to a wavelength of about 515 nm as evidenced by the peak emission wavelength of Ir(ppy)<sub>3</sub> (e.g. see c. 31, l. 38-39).

Of the compounds previously referenced with respect to independent claims 1, 18, 54 and 72, Compound Nos. 511-517, 548-553 and 719-725 further meet the limitations recited in present claims 7, 25, 60 and 79. Compound Nos. 511-517 and 548-553 further meet the

limitations recited in present claims 8, 9, 61 and 62. Compound Nos. 511, 512, 514, 515, 548, 550 and 551 further meet the limitations recited in present claims 10 and 63.

Tsuboyama's Compound Nos. 211-225, 269-275, 426-440, 469-475, 511-517, 548-553, 589-595, 626-631, 684-690, 719-725 and 754-760 meet the limitations of the compound claimed in present independent claim 26, and the compound required for the device of present independent claim 81. Compound Nos. 211-225, 269-275, 426-440, 469-475, 511-517, 548-553, 589-595 and 626-631 further meet the limitations recited in present claims 27 and 82. Compound Nos. 211-225 and 269-275 further meet the limitations recited in present claims 28 and 83. Compound Nos. 211-216, 222, 223 and 269 further meet the limitations recited in present claims 29-31 and 84-86.

Tsuboyama's Compound Nos. 656-760 meet the limitations of the compound claimed in present independent claim 33, and the compound required for the device of present independent claim 89. Compound Nos. 691-725 further meet the limitations recited in present claims 34 and 90. Compound Nos. 656-690 further meet the limitations recited in present claims 35 and 91. At least Compound Nos. 656, 663, 670, 677, 684, 691, 698, 705, 712, 719, 726, 733, 740, 747 and 754 further meet the limitations recited in present claims 39 and 95, each of these prior art compounds having at least one unsubstituted ppy ligand.

Of the compounds referenced in the preceding paragraph with respect to present independent claims 33 and 89, Compound Nos. 684-690, 719-725 and 754-760 further meet the limitations recited in present claims 41 and 97. Compounds Nos. 719-725 further meet the

limitations recited in present claims 42 and 98. Compound Nos. 684-690 further meet the limitations recited in present claim 49.

Tsuboyama's Compound Nos. 241-275, 441-475, 518-553 and 596-631 also meet the limitations of the compound claimed in present independent claim 33, and the compound required for the device of present independent claim 89. Compound Nos. 518-553 further meet the limitations recited in present claims 34 and 90. Compound Nos. 241-275 further meet the limitations recited in present claims 35 and 91. At least Compound Nos. 241-245, 248-252, 255-259, 262-266, 269-273, 441-445, 448-452, 455-459, 462-466, 469-473, 518-523, 530-553, 596-601 and 608-631 further meet the limitations recited in present claims 39 and 95, each of these compounds having at least one unsubstituted ppy ligand.

Of the compounds referenced in the preceding paragraph with respect to present independent claims 33 and 89, Compound Nos. 269-275, 469-475, 548-553 and 626-631 further meet the limitations recited in present claims 41 and 97. Compound Nos. 548-553 further meet the limitations recited in present claims 42 and 98. Compound Nos. 269-275 further meet the limitations recited in present claim 49. Compound No. 269 further meets the limitations recited in present claims 50-52 and 106-108.

7. Claims 3, 5, 6, 20, 22, 23, 37, 39, 40, 56, 58, 59, 74, 76, 77, 93, 95 and 96 are rejected under 35 U.S.C. 102(e) as being anticipated by Tsuboyama et al. (US 6,783,873 B2) as applied to claims 1, 5, 7-10, 18, 22, 24-31, 33-35, 39, 41, 42, 49-52, 54, 58, 60-63, 71, 72, 76, 78-86,

88-91, 95, 97, 98, 106-108 and 110 above, and as evidenced by Thompson et al. (US 2002/0034656 A1).

An unsubstituted phenylpyridine ligand (the ligand in formula 20 as shown in column 20 of the Tsuboyama patent) meets the limitations of a photoactive ligand having a triplet energy corresponding to a wavelength of 500-520 nm (e.g. see c. 31, l. 38-39 of the Tsuboyama patent and see Fig. 29 of the published application of Thompson et al.). Of the substituted phenylpyridine ligands utilized by Tsuboyama et al., at least the methyl-substituted ligand in formula 22 also meets the limitations of a photoactive ligand having a triplet energy corresponding to a wavelength of 500-520 nm (see Fig. 29 of the Thompson publication).

Of the ligands utilized by Tsuboyama et al., at least the unsubstituted thiienylpyridine ligand in formula 27 meets the limitations of a photoactive ligand having a triplet energy corresponding to a wavelength of 550-600 nm (see Fig. 27 of the Thompson publication).

Of the ligands utilized by Tsuboyama et al., at least the unsubstituted benzothienylpyridine ligand in formula 28 meets the limitations of a photoactive ligand having a triplet energy corresponding to a wavelength greater than 590 nm (see Fig. 31 of the Thompson publication).

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 12 and 65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuboyama et al. (US 6,783,873 B2) as applied to claims 1, 5, 7-10, 18, 22, 24-31, 33-35, 39, 41, 42, 49-52, 54, 58, 60-63, 71, 72, 76, 78-86, 88-91, 95, 97, 98, 106-108 and 110 above, and for the further reasons set forth below.

The compound having the structure set forth in present claims 12 and 65 is a compound according to formula (1) of Tsuboyama et al. in which each of M<sub>1</sub> and M<sub>2</sub> is Pt, each of Q<sub>1</sub> and Q<sub>2</sub> is the substituted phenylpyridine ligand shown in Tsuboyama's formula 22, and P is the diacac ligand shown in Tsuboyama's formula 15.

Tsuboyama et al. do not explicitly disclose the compound of the structure set forth in present claims 12 and 65, but the compound is clearly within Tsuboyama's disclosure and is particularly close in structure of Tsuboyama's Compound Nos. 511 and 512.

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to make compounds similar to structure to the specific compounds disclosed in the prior art with the expectation that compounds similar in structure would have similar properties and could be used for the same purpose. One of ordinary skill in the art at the time of the invention would have reasonably expected that a compound similar to Tsuboyama's Compound Nos. 511 and 512, but having structure 22 for Q1 and Q2 instead of structure 20 (in Compound No. 511) or structure 23 (in Compound No. 512), would have similar properties and could be used for Tsuboyama's purposes.

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10. Claims 1-110 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuboyama et al. (US 6,783,873 B2) as applied to claims 1, 5, 7-10, 18, 22, 24-31, 33-35, 39, 41, 42, 49-52, 54, 58, 60-63, 71, 72, 76, 78-86, 88-91, 95, 97, 98, 106-108 and 110 above, and further in view of Igarashi et al. (US 2001/0019782 A1) and Ise et al. (US 2002/0028329 A1).

Tsuboyama et al. do not anticipate every possible compound within the scope of the present claims, particularly the specific compounds having the structures shown in present claims 11-17, 32, 46-48, 53, 64-70, 87, 102-104 and 109. However, Tsuboyama's compounds are not limited to the specific compounds defined in the Tables.

Tsuboyama's compounds have two metals connected by a quadridentate ligand. The two metals may be the same or different. Iridium and platinum are both disclosed as suitable metals. Tsuboyama's compounds also have bidentate ligands Q1 and Q2. Q1 and Q2 may be the same or different bidentate ligands. The methyl-substituted phenylpyridine ligand as in the structure of present claims 12, 13, 17 and others, the unsubstituted thienylpyridine ligand as in the structure of present claim 15 and others, and the unsubstituted benzothienylpyridine ligand as in the structure of present claim 16 and others, are all disclosed in the Tsuboyama patent as suitable ligands for Q1 and/or Q2. See formulae 22, 27 and 28 in c. 12-13 of the patent.

The difluoro-substituted phenylpyridine ligand as in the structure of present claims 11-16 and others, and the phenylquinoline ligand as in the structure of present claims 14, 17 and others, are not explicitly disclosed in Tsuboyama et al. However, these ligands are known in the art. For example, see formula (I-8) on page 11 of Igarashi's publication and see formula (K-3) on page 50 of Ise's publication.

It would have been an obvious modification to one of ordinary skill in the art at the time of the invention to utilize different combinations of ligands and metals in order to make metal coordination compounds similar to those disclosed by Tsuboyama et al. It would have been within the level of ordinary skill of a worker in the art at the time of the invention to determine suitable and optimum combinations of ligands and metals, and to select ligands from those known in the art to be suitable for making luminescent metal coordination compounds. One of ordinary skill in the art would have been guided in the selection of particular ligands by the known properties of those ligands.

11. Miscellaneous:

In the second line after the formula in claims 10 and 63, and in the fifth line after the formula in claims 44 and 100, the examiner suggests inserting a comma or --or-- after the first occurrence of "aromatic".

In the fifth line after the formula in claims 10 and 63, in the sixth line after the formula in claims 29, 50, 84 and 106, and in the seventh line after the formula in claims 44 and 100, the examiner suggests inserting a comma after the first occurrence of "aryl".

In the third line after the formula in claims 29, 50, 84 and 106, "m" should read --each of  $m_1$  and  $m_2$ -- (or similar language).

The examiner suggests inserting --the compound-- before "having the structure" in the first line of claims 63-70, 84, 87, 100, 102-104, 106 and 109 since the specified structure represents the compound.

12. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 6:30 a.m. to 4:00 p.m. Monday, Tuesday, Thursday and Friday, and every other Wednesday from 6:30 a.m. to 3:00 p.m.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

MRY  
September 26, 2006



MARIE YAMNITZKY  
PRIMARY EXAMINER

